



national
accelerator
laboratory

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Subject

BOOSTER RADIUS.

The booster radius should be chosen to permit 1, 2 or 4 turn injection into the accumulator.

In this case the harmonic numbers are related by:-

$$H_A = 13\frac{1}{4} \cdot h_B$$

However the main ring average radius is the fixed quantity and depending on the accumulator location within the main ring tunnel we have

$$H_A = H_M \quad (a)$$

$$= H_M - 1 \quad (b)$$

$$= H_M - 2 \quad (c)$$

For a booster harmonic number $h_B = 84$ we have

$$H_A = 13 \times 84 + 21 = 1113$$

Hence the corresponding main ring harmonic nos are

$$H_M = 1113, 1114, 1115$$

(a) (b) (c)

The booster radius $R = 1000m \times \frac{h_B}{H_M}$

$$\text{is } R_B = 75.4717 \text{ m} \quad (a)$$

$$= 75.4039 \text{ m} \quad (b)$$

$$= 75.3363 \text{ m} \quad (c)$$

Note:- Case (a) would still be the appropriate booster radius without an accumulator since 2 or 4 turn injection into the main ring are preferable options to 3 turn from the point of view of phase space dilution.

R.B.B.